Two Projects to Report

Project 1. Assessing the role of grizzly bears in the decline of woodland caribou.

Project 2. Do oil and gas activities and access control measures affect the distribution, abundance and movements of grizzly bears?
Project 1. Assessing the role of grizzly bears in the decline of woodland caribou

Project Duration
2014-2016

**Objective 1**
Predator prey habitat models - determine the spatial and temporal habitat use of caribou and grizzly bears within the A La Peche and Redrock-Prairie Creek herds.

**Objective 2**
Kill site investigations - determine kill rates of caribou by grizzly bears in relation to gender, age and landscape characteristics.

**Objective 3**
Isotopes - Use captive grizzly bears to develop and validate new techniques to quantify caribou within the diet of grizzly bears from hair using stable isotope techniques.
Project 1. Assessing the role of grizzly bears in the decline of woodland caribou
Objective 1 - Predator prey habitat models

Methods
Combine female summer caribou RSF model (DeCesare et al. 2012) with grizzly bear RSF model (Nielson et al. 2002) using an RSF tool developed by fRI (Cranston 2013)

Results
Two caribou remains were found; both in low caribou RSF and medium or high grizzly bear RSF (neither are confirmed GB kills)

<table>
<thead>
<tr>
<th>Caribou:Grizzly RSF values</th>
<th>Percent of Study Area</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Redrock-Prairie Creek</td>
</tr>
<tr>
<td>Low:Low</td>
<td>11.21</td>
</tr>
<tr>
<td>Low: Med</td>
<td>27.14</td>
</tr>
<tr>
<td>Low: High</td>
<td>58.92</td>
</tr>
<tr>
<td>Med: Low</td>
<td>0.04</td>
</tr>
<tr>
<td>Med: Med</td>
<td>0</td>
</tr>
<tr>
<td>Med: High</td>
<td>2.57</td>
</tr>
<tr>
<td>High: Low</td>
<td>0</td>
</tr>
<tr>
<td>High: Med</td>
<td>0</td>
</tr>
<tr>
<td>High: High</td>
<td>0.12</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
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</table>

A La Peche/Little Smoky RSF with GB RSF
RRPC RSF with GB RSF
These results support the concept that caribou have evolved to spatially separate themselves on the landscape from predators.

There was little overlap of high grizzly bear and caribou RSF values in our study area.
Project 1. Assessing the role of grizzly bears in the decline of woodland caribou
Methods

- Capture and collar 11 grizzly bears within caribou range.
- Download and process collar data to discern clusters (twice/month).

A cluster is a group of sequential locations for a bear that occur at the same location for > 2 hrs.

- Assign a Cluster Class to each cluster based on duration; if all clusters within a class could not be visited, randomly select at least three to visit.

<table>
<thead>
<tr>
<th>Cluster Class</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Top three longest duration clusters</td>
</tr>
<tr>
<td>B</td>
<td>&gt;11 hrs</td>
</tr>
<tr>
<td>C</td>
<td>8-10.5 hrs</td>
</tr>
<tr>
<td>D</td>
<td>5-7.5 hrs</td>
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<tr>
<td>E</td>
<td>3-4.5 hrs</td>
</tr>
</tbody>
</table>
Objective 2 - Kill site investigations

At each cluster...

- Assign main bear activity (bed, carcass, foraging, hair scat, unknown).
- If carcass present – identify carcass species/age, bear feeding sign (burial, peeled hide), other carnivore sign (scats, sheered hair, bone locations/condition, rumen present, etc.).
- Collect any bear hair scats if no carcass was present, and any bones or hair from carcass if species was not certain.
Project 1. Assessing the role of grizzly bears in the decline of woodland caribou

RESULTS - Cluster Visits

Visited 451 Clusters
- Beds 177
- Day bed 24
- Carcass 64
- Foraging 90
- Hair Scat 47
- Unknown 39

Carcasses
- Beaver 2
- Black bear 1
- Caribou 2
- Deer 3
- Moose Ad 12
- Moose Ylg 4
- Moose Calf 36
- Mt Goat 1
- To Confirm 3
- Hair to ID 29
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**Work In Progress**

Confirm carcass species using hair and bones collected at site
Identify prey species in hair scats collected at clusters when no carcass remains were found using hair medulla/scale pattern
  - a bear could eat an entire caribou calf in early spring and leave no evidence of carcass so hair in scat could confirm if/when this happened

Determine which carcasses were likely scavenged vs killed by collared grizzly bear
  - Use evidence such as:
    - duration at carcass
    - sign of burial, # bear scats, bear beds
    - other carnivore scats, other carnivore sign
    - condition of carcass etc.
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Can we use stable isotope analysis to understand grizzly bear ungulate consumption?
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Can we use stable isotope analysis to understand grizzly bear ungulate consumption?

**Stable Isotope Results:**

1. We can discriminate C/N ratios between ungulate species from tissue samples of meat. (reindeer, moose and elk)

<table>
<thead>
<tr>
<th>Ungulate</th>
<th>δ¹³C (‰)</th>
<th>δ¹⁵N (‰)</th>
<th>δ³⁴S (‰)</th>
<th>C:N</th>
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<tbody>
<tr>
<td>Reindeer</td>
<td>-22.5 (0.1)</td>
<td>3.0 (0.1)</td>
<td>16.6 (0.3)</td>
<td>3.8 (0.2)</td>
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<tr>
<td>Moose</td>
<td>-26.5 (0.5)</td>
<td>2.1 (0.2)</td>
<td>2.0 (0.1)</td>
<td>3.7 (0.1)</td>
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<tr>
<td>Elk</td>
<td>-26.0 (0.1)</td>
<td>5.2 (0.2)</td>
<td>6.7 (0.1)</td>
<td>4.2 (0.2)</td>
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</table>

![Graphs showing δ¹³C, δ¹⁵N, and δ³⁴S values for Reindeer, Moose, and Elk.](image-url)
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Can we use stable isotope analysis to understand grizzly bear ungulate consumption?

Following 30 days of ungulate meat consumption with no supplements....

**Stable Isotope Results:**

2. Stable isotope signatures from blood serum **did allow** discrimination of ungulate meat diets by bears

3. However stable isotope signatures from hair analysis (monthly) **did not allow** us to discriminate ungulate meat in diets of bears.

**Conclusion:**

The use of bear hair as a monitoring tool for caribou meat in their diet is not viable. Blood serum could be used but this would require capture and handling of many bears which is impractical.
Project 2. Do oil and gas activities and access control measures affect the distribution, abundance and movements of grizzly bears?

In progress

Specific, research questions we will address...

1) Has the use of access management efforts (locked gates) by the oil and gas sector had an influence on the habitat use, movements and mortality rates of grizzly bears between 2004 and 2015?

2) Do the current mortality risk models being used in management adequately reflect grizzly bear use and response to oil and gas activities on the landscape?
Project 2. Do oil and gas activities and access control measures affect the distribution, abundance and movements of grizzly bears?

In progress

Research Approach and Methodology

1) Datasets in place
   - Grizzly bear GPS data (1999-2015)
   - Inventory of oil and gas developments and roads

2) Data to collect in 2015
   - Access control features such as gates
Project 2. Do oil and gas activities and access control measures affect the distribution, abundance and movements of grizzly bears?

In progress
Project 2. Do oil and gas activities and access control measures affect the distribution, abundance and movements of grizzly bears?

In progress
Thank you

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<th>AUPRF</th>
<th>Shell Canada</th>
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